The selection of a single pattern aircraft for inclusion with R/C Modeler Magazine's Flight Training Course – Volume II presented quite a problem. There are literally hundreds of pattern aircraft designs available and each is designed to do virtually the same job to the individual satisfaction of its designer. The current American pattern ship flies much faster than the FAI designs used by other countries as evidenced in the recent World Championships. Due to this difference, which ultimately resulted in a lower score for the American team, we are presenting an aircraft that performs precision maneuvers at a slightly lower speed range than the hundred mile an hour plus "bullets" currently used in the AMA Pattern. Miss Norway, designed by Ernst Totland, is just such an aircraft - - - it will do the AMA Pattern and the FAI Pattern with precision, grace, and with a wide speed envelope. You will find that Miss Norway is as close to the ideal as you can obtain in a pattern ship, whether it be for the AMA or the FAI Pattern competition. The purpose of presenting this chapter is to start you in the direction of competition pattern flying and hope that your own personal development in this area will eventually lead to your contribution to the state of the art of pattern flying. Study the preceeding chapters well, build Miss Norway carefully, and then practice, practice, practice. And, when you think you can't practice any longer, start all over again and keep on practicing the maneuvers until you have them letter perfect by sheer reflex. Develop your presentation as well as your maneuvers and then set your sights toward the local, regional, national, and even the World Championships. It can be done.

More important, it can be done by you.

- - - - Don Dewey

Often, certain models are referred to as "winners."

As an example, "the model that won the World Championships, the Nationals, or the Winter Nationals." I, personally, feel that this is the wrong approach to any aircraft. It is not the model that wins but, rather, the essential ingredient is a **combination of the pilot and his aircraft.** The problem is to find the model that suits the pilot's personal flying style. Winners have succeeded in accomplishing just that. Of course, it also takes hard work and many, many hours of practice.

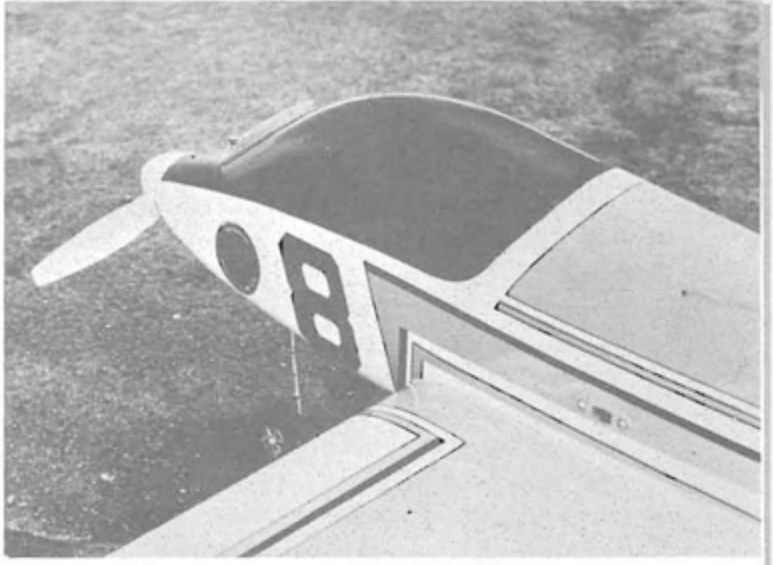
Having tried many American and European designs and not finding one that suited my own style of flying, I decided to design one myself. Miss Norway Mk I was not particularly successful primarily due to an adversely low wing loading. The Mark II, as presented here, however, is just what I was searching for and I have now completed two successful seasons with it.

The design incorporates a few departures from past and current competition design trends. First of all, it is intended for relatively slow flying and constant speed through all the maneuvers. I, personally, feel that this gives the impression of gracefulness. I don't mean to say that it is slow - - - in fact, it is about the fastest ship in our club, but I wanted it to perform well at below the average speed as well as at full throttle. Many models today simply will not do that since a multitude of errors can be covered up by excessive speed.

The thin airfoils used today make the models easily resemble a bomb which certainly is a handicap in international competition. They also make the landing approach a difficult maneuver as it takes time to bleed off excess speed. Therefore, I decided on a fairly thick airfoil - - - 17% at the root and 18% at the tip. A low aspect ratio wing was chosen because this wing tends to develop more drag relative to its lift than a high aspect ratio wing at low speed. A little extra drag in the landing sequence will certainly not detract from its performance. I also feel that a short wing makes a model less sensitive to wind gusts in the roll mode.

The thick wing produces substantial drag and makes a powerful engine absolutely necessary in order to perform large maneuvers. The OS .60 is satisfactory on straight fuel when fitted with a flow-through muffler or the standard OS muffler can be used with the outlet hole enlarged to at least 11 millimetres. However, the extra power of the Webra Blackhead would be a better choice.

Here on the West Coast of Norway we usually have windy and gusty weather. Smooth performance under these conditions is hard to achieve with most models used today. One solution is to construct large airplanes, but such a model needs speed because of the weight needed to keep the wing loading at a reasonable level. As I wanted a fairly slow flying aircraft, I had to make it in the medium weight class to be able to use the thick airfoil. A wing loading of 80 g/dm^2 (grams/square decimetres) had proved to be great for our gusty conditions. The result is the "small" wing shown on the plans. A large fuselage was chosen for greater visibility and the long tail moment makes the elevator response smoother in the pitch mode. The huge side area makes some fantastic four point and slow rolls possible.



Another departure from the usual pattern design is the low position of the horizontal stabilizer. The main reason for this was to make the stab detachable and this was the easiest way out. One side advantage I had not counted on was the smooth take-off. The low stab seems to produce a ground effect when sufficient speed is gained which prevents the "kink" in the take-off path.

Inasmuch as all pattern ships are simply the result of many compromises, the perfect model is virtually not obtainable. The most apparent negative characteristic of the Miss Norway Mk II is the spin entry. The spin, itself, is no problem, whatsoever, but to get her into a distinctive stall may be a bit tricky. It is only a matter of practice and when it stalls, it is without dropping a wing.

Another possible difficulty may be in crosswind flying. The huge side area makes this ship rather sensitive to crosswinds but this is easily corrected. Looping maneuvers, performed in calm weather or straight into the wind, require little or no corrections with rudder and ailerons.

The plans presented with this chapter show a conventional landing gear. My latest model, however, utilizes a retractable gear system. This is absolutely fantastic in strong, gusty wind. The

aircraft becomes rock steady and I would highly recommend this feature as the model becomes even more wind resistant.

The construction of Miss Norway Mk II is quite easy and fairly straightforward. No jig is necessary but your building surface must be perfectly straight. We are not presenting a sequence of construction photographs since it is assumed that, by the time you get to this point in the Flight Training Course, you have mastered the basic construction techniques as used in the RCM Basic and Advanced Trainers. Since the construction techniques are virtually the same, we suggest you re-read the chapters on the construction of both of those aircraft before attempting to build Miss Norway Mk II. During construction, be sure to check carefully and constantly for any mis-alignment during the building process. This will reduce flight trimming problems. Also, be certain to use only medium to hard balsa. I prefer to use slow drying epoxy on all wood-to-wood joints as ample time for corrections is available and the strength exceeds all other adhesives.

One word about engine mounts before we get into the construction of the Mk II. I highly recommend the use of 1" long #6 or #7 sheet metal screws for mounting the engine to the maple mounts. This may, one day, save your engine! These sheet metal screws are extremely hard but, when the engine gets a "kick" in a crash, the heads will pop off and the engine will fall out freely. I have, personally, seen several examples of this with only a bent crankshaft end as the worst damage to the engine. On the other hand, if it is solidly mounted to a point where it cannot break loose in the event of a crash, you may incur extensive damage or even the total loss of your expensive .60 power plant.

CONSTRUCTION

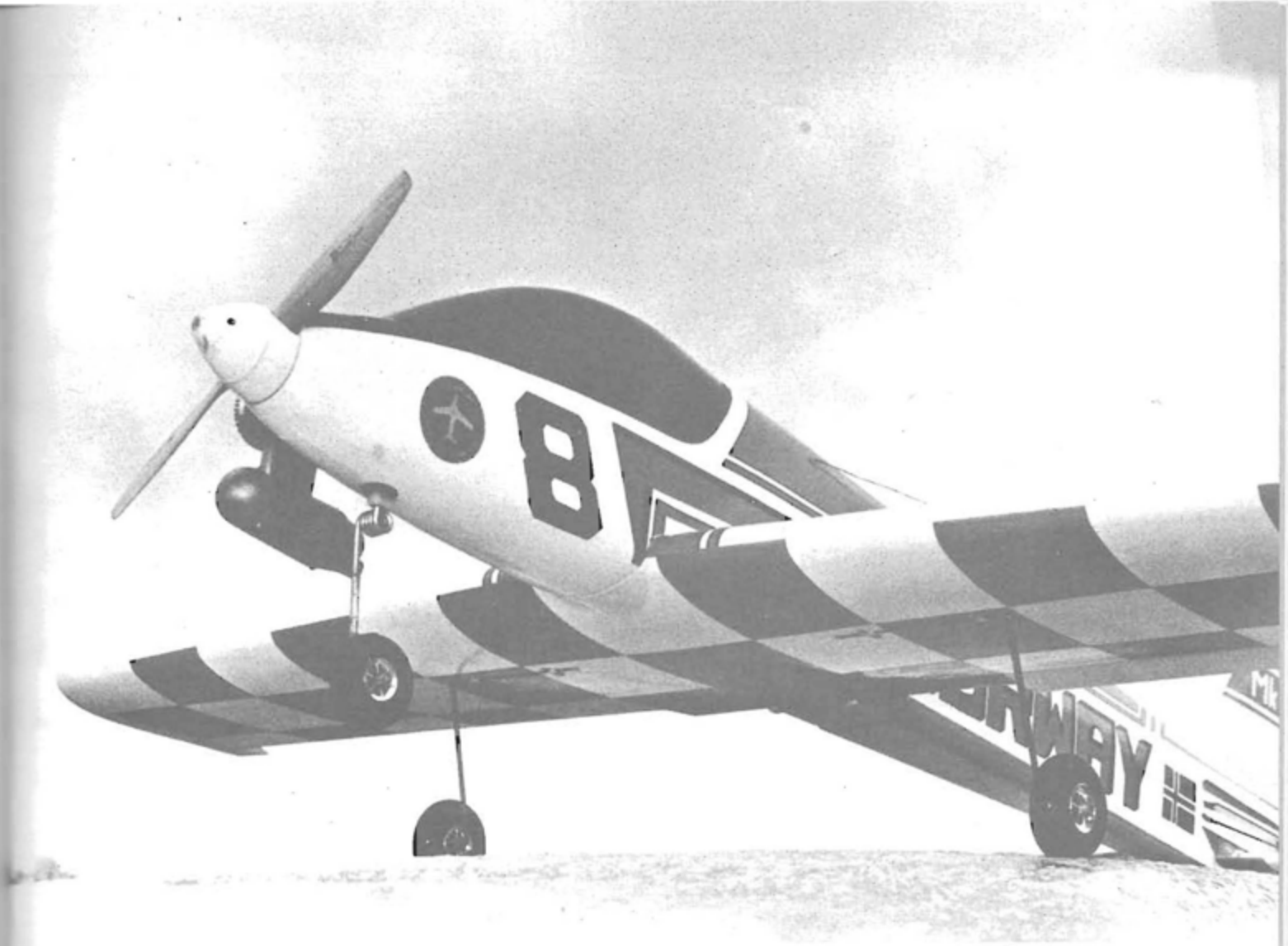
WING:

The wing is a foam core type and can easily be cut with any one of the homemade or commercially available hot wire cutters. By the time this book is in print, one or more of the commercial foam wing manufacturers may have a foam core in stock if you would prefer to purchase one. The 1/8" sheet balsa sub-leading edge is used to obtain a better wood-to-wood joint for the wing sheeting. Be sure to hollow the right wing tip since the left wing must be slightly heavier than the right wing in order to compensate for the side mounted engine. A perfectly balanced wing is an absolute must for a pattern aircraft. The leading edge is a constant radius from the root to the tips so make a template to insure accuracy when sanding. Also, build the ailerons on a flat surface adding the leading edge as the final step.

The stabilizer is of the built-up type but foam is just as satisfactory if you prefer. My model turned out nose heavy so the extra weight will probably not detract in any way from the performance of the model.

FUSELAGE:

Building the fuselage entails a few unusual techniques so I will go into a little bit more detail at this point. The first step is to cut the fuselage sides from 1/8" medium balsa sheet and the doublers from 1/16" plywood. Reinforce the tail area with 1/16" hard balsa or ply doublers, as you prefer. Be sure to note the grain direction shown on the plans if balsa is used. If you have to splice the fuselage sides make sure the splice is in the tail area and make the tail doublers long enough to cover the joint. To pre-set the nose curve, block up the side sheet as shown in the sketch and add the



plywood doubler. Use epoxy or contact adhesive at this point. Next, glue in the 1/4" square longerons.

Cut out all bulkheads paying particular attention to the grain direction and then draw a centerline on each bulkhead. Now, take the drawing, top view, to your building surface. Pin bulkheads B5 through B9 on the drawing. Careful alignment at this point is absolutely essential. Securely attach the 1" sheet balsa nose block to the building surface with pins. Mark off the centerline and then glue bulkheads B1 and B3 to the nose block.

The next step is to glue the fuselage sides in position to bulkheads 5 through 9 only. I prefer making up the tail section first as this makes absolutely perfect alignment much easier. Glue the sides to bulkheads B1 and B3, the bottom block, then add the cockpit floor and bulkheads B2 and B4. Use masking tape and pins to hold the structure together until the adhesive dries.

Cut out the fuselage top sides from 1/8" medium balsa sheet, splicing the forward part, if necessary. Glue these sides to the edge of the lower fuselage sides in an upright position and don't bend the sheet down on the bulkheads. Allow to dry. Now, wet the outside of the sheets. Glue the sides to the bulkheads and add the top nose sheeting. Use masking tape instead of pins wherever possible. Finally, add the top 3/8" sheet and the vertical fin. Note that the fin is built into the top sheet for maximum rigidity.

Remove the fuselage structure from the building surface and attach the bottom sheeting, making sure that you apply it crossgrain. Make up the motor mounts from 3/8" square hardwood and drill the mounting holes for your particular engine. Using slow drying epoxy, glue the lower mount to the fuselage structure. Check carefully for 0-0 thrust. Allow to dry then add the upper mount and bolt the engine in position to align the mount. Build up the nose where possible with medium balsa blocks.

Now, fit the wing and horizontal stabilizer to the fuselage and shape to the form shown on the plan. The canopy is not commercially available, so you have to make it yourself. It is, however, quite easy requiring only a male mold made of balsa, obechi, pine, or the equivalent. If you use hard

balsa or obechi, fine sanding is the only finish necessary. Other materials require a thick layer of epoxy or polyester resin for a smooth surface. Place both the mold and the plastic material mounted on the structure shown, in the oven. The temperature depends on which material you use. Use a minimum thickness of .5 millimetre (approximately .02") plastic and preferably colored if your mold is not perfect. Do not use too much force pulling the plastic down over the mold. Rather, put the whole assembly in the oven, apply more heat and try again.

If you plan to use a retract gear system, I recommend the following modifications to Miss Norway Mk II:

a. Use 1" sheet balsa from bulkhead B2 forward (similar to the fuselage bottom) instead of the bulkhead and sheet construction. Balsa blocks are great vibration dampeners.
b. Move bulkhead B1 1/2" forward and don't forget to lengthen the fuselage sides accordingly.
c. Use a 1¾" nose wheel and 2¼" main wheels.
d. Enlarge the wing span, if necessary, to keep the wing and stabilizer loading within FAI regulations for a maximum of 75 g/dm² total wing and stabilizer loading.

FINISHING:

Every modeler has his own preference for finishing techniques. I prefer Super MonoKote for my pattern ships. It is fast and easy to apply and, when accidents occur, the repair time is cut down to a minimum. I have been flying my model for two competition seasons now and, after a thorough cleaning it is almost impossible to see that it has ever been used. One disadvantage of MonoKote, however, is the soft surface, so avoid using soft balsa.

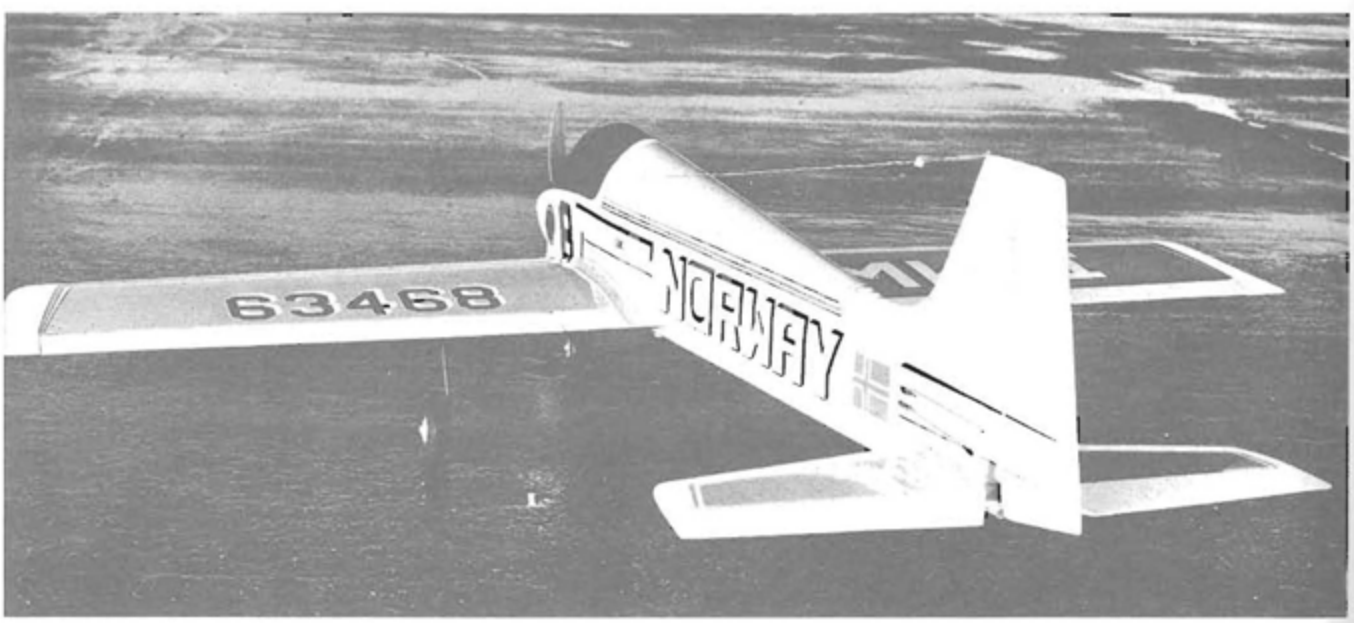
TRIMMIMG AND FLYING:

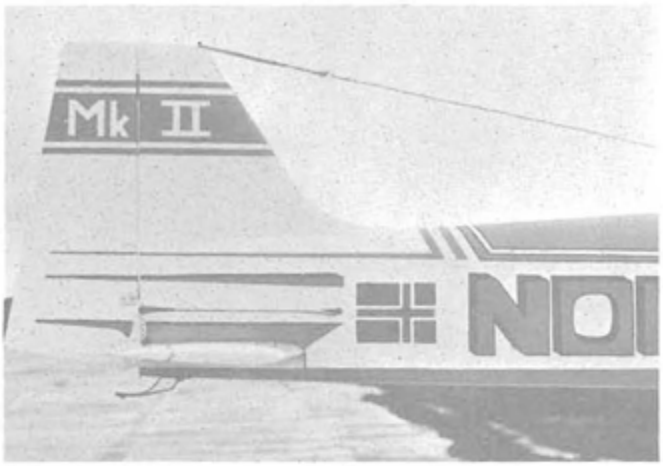
And now the work begins. Initial flight trimming can be a rather frustrating experience and I have, personally, known competition fliers who have claimed a hundred flights as being necessary for trimming a model properly. Re-read the sections in both volumes of the Flight Training Course on trimming your aircraft so that you will achieve proper trim before attempting your pattern maneuvers.

I will suggest one word of caution - - - do not exceed the aileron throw shown on the plan. With this amount of throw the three roll maneuver takes approximately 5 seconds. The rather large aileron area makes Miss Norway Mk II a bit sensitive in the roll mode if too much throw is used. This is also true for the elevator throw.

One hint and kink might be in order for potential pattern fliers. Due to the different types of fields from which you will be required to fly at various contests, you'll undoubtedly encounter problems with dirt in the fuel system. The fuel filters available for model use are more or less useless as the brass cloth is not "fine" enough. Rather, buy yourself one of the cheap automotive fuel filters and use it in the refilling line to filter the fuel before it enters the tank thus requiring no filter in the gas tank of the aircraft. This filter will last an entire season through, at least.

I will not claim Miss Norway to be the ultimate competition model since I don't think that this goal will ever be achieved, but it has proven to be the right one for me and may be just that for you as well. Please feel free to write me in care of R/C Modeler Magazine, P.O. Box 487, Sierra Madre, California 91024.

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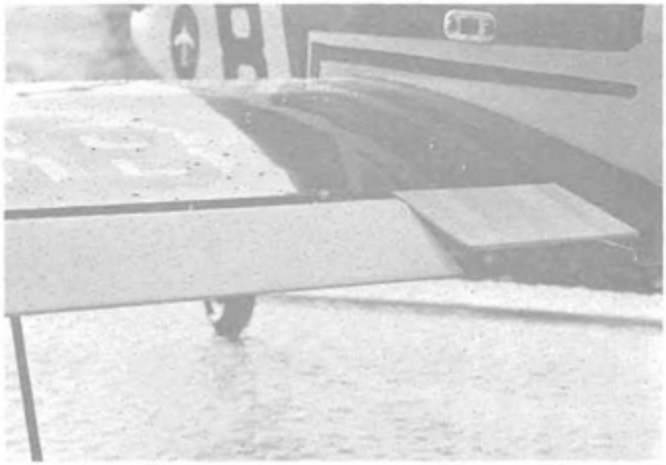

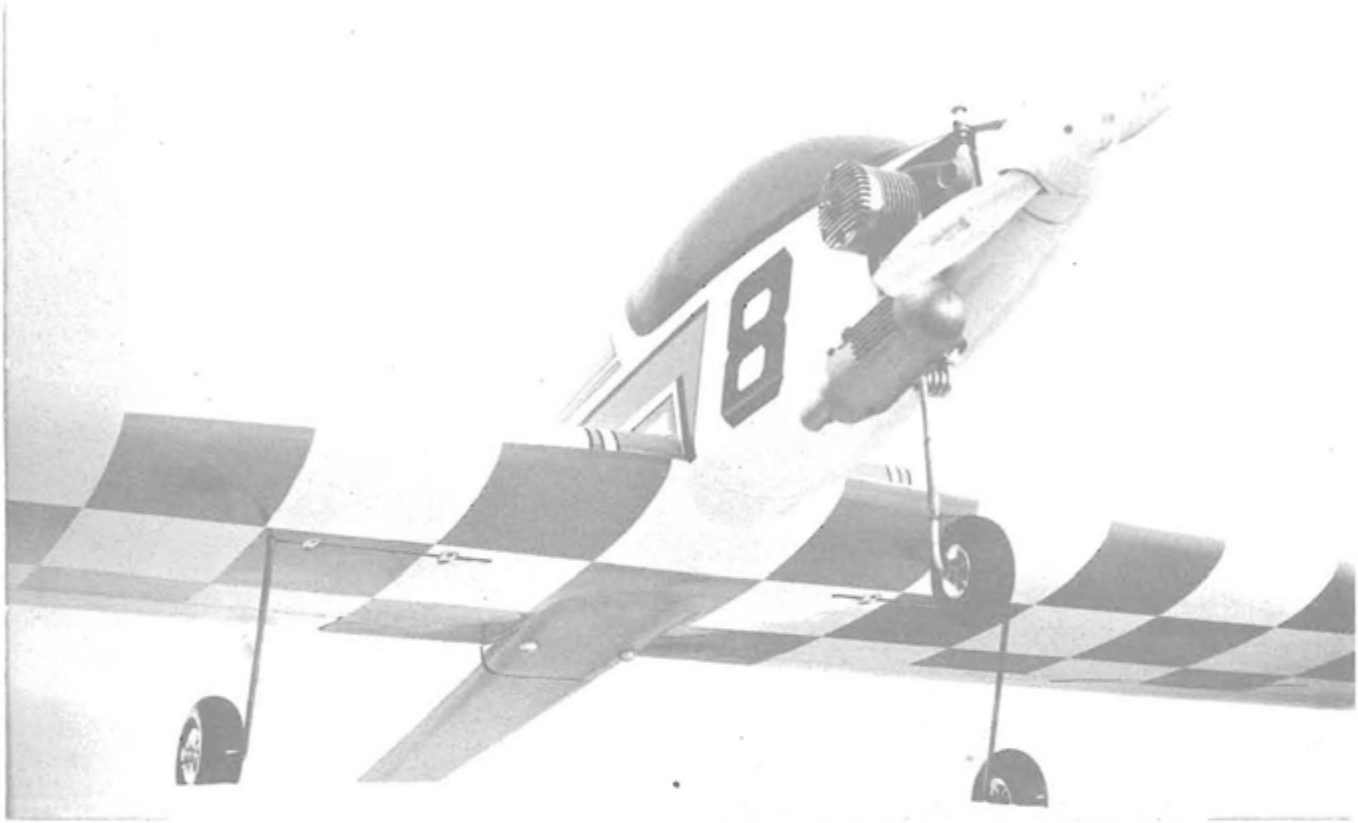
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